

What Is Claimed Is:

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A system comprising:

a process chamber having a feed inlet, a low pressure outlet and a high pressure outlet;

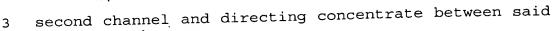
a feed pump;

a common shaft having rotatably coupled thereto a booster pump fluidically coupled between said feed pump and said feed inlet and an energy recovery turbine fluidically coupled to said high pressure outlet through a first channel, said energy recovery turbine drives said booster pump; and a second channel fluidically coupling said

2. A system as recited in claim 1 wherein 2 said process chamber has a first reverse osmosis 3 membrane therein.

process chamber and said high pressure outlet.

- 3. A system as recited in claim 1 wherein
 said low pressure outlet comprises a permeate outlet.
- 1 4. A system as recited in claim 1 wherein 2 said high pressure outlet comprises a concentrate 3 outlet.
- 5. A system as recited in claim 1 further comprising a first control valve coupled between said booster pump and said feed pump.
- 1 6. A system as recited in claim 1 further 2 comprising a second control valve coupled within said



- feed pump and said booster pump. 4
- A system as recited in claim 1 further 1
- comprising a jet pump fluidically coupled to the 2
- second channel to couple the high pressure outlet to 3
- said feed pump outlet. 4
- 8. A system as recited in claim 7 wherein 1
- said jet pump 4 s coupled between said feed pump and 2
- said booster pump. 3
- A system as recited in claim 8 wherein 1
- said jet pump is coupled between said booster pump 2
- and said process chamber. 3
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- 10. A reverse osmosis system comprising: a reverse osmosis process chamber having a 2
- first feed inlet, a first permeate outlet and a first 3
- concentrate outlet; 4
- a feed pump; 5
- a common shaft) having rotatably coupled 6
- thereto a booster pump fluidically coupled between 7
- said feed pump and said first feed inlet and an 8
- energy recovery turbine fluidically coupled to said 9
- first concentrate outlet through a first channel, 10
- said energy recovery turbine driving said booster 11
- pump; and 12
- a second channel coupled to said first 13
- concentrate outlet for directing a portion of said 14
- concentrate between said booster pump and said feed 15
- 16 inlet.





- 1 11. A system as recited in claim 10
- 2 wherein said second channel directs concentrate
- 3 between said feed pump and said energy recovery
- 4 turbine.
- 1 12. A system as recited in claim 10
- 2 wherein said second channel directs said concentrate
- 3 between said energy recovery turbine and said process
- 4 chamber.
- 1 13. A system as recited in claim 10
- 2 further comprising a jet pump coupling said second
- 3 channel to said feed pump outlet.
- 1 14. A system as recited in claim 13
- 2 wherein said jet pump is coupled between said feed
- 3 pump and said booster pump.
- 1 15. A system as recited in claim 13
- 2 wherein said jet pump is coupled between said booster
- 3 pump and said process chamber.
- 1 16./A method of operating a process having
- 2 a feed pump directing fluid to a process chamber
- 3 having a high pressure outlet and a low pressure
- 4 outlet comprising the steps of:
- 5 boosting a pressure of fluid output from a
- 6 feed pump prior to entering to a first process
- 7 chamber (using) from a first portion of a high pressure
- 8 fluid from a high pressure outlet of a first process
- 9 chamber;
- 10 recirculating a second portion of the high
- 11 pressure fluid; and



- 12 fluidically coupling the second portion of
- the high pressure fluid between the feed pump and the 13
- 14 process chamber.
- 1 17. Α method as recited in claim 16
- 2 further comprising the steps of providing
- energy recovery turbine coupled to a booster pump to 3
- preform the step of boosting. 4
- 1 18. method as recited in claim
- further comprising the steps of providing a jet pump 2
- to preform the step of fluidically coupling. 3
- 1 19. A method as recited in claim 16
- further comprising the steps of fluidically coupling 2
- a pumped fluid input of the jet pump to the second 3
- 4 portion of high pressure fluid and fluidically
- coupling a driving fluid input to fluid output from 5
- the feed pump. 6
- 1 A method recited in as claim
- further comprising the steps of fluidically coupling 2
- a pumped fluid input of the jet pump to fluid output 3
- from the feed pump and fluidically coupling a driving 4
- fluid input to the second portion of high pressure 5
- 6 fluid.